



# UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE  
United States Patent and Trademark Office  
Address: COMMISSIONER FOR PATENTS  
P.O. Box 1450  
Alexandria, Virginia 22313-1450  
www.uspto.gov

| APPLICATION NO.  | FILING DATE | FIRST NAMED INVENTOR | ATTORNEY DOCKET NO. | CONFIRMATION NO. |
|--|-------------|----------------------|---------------------|------------------|
| 10/816,221   | 04/02/2004  | Takayuki Nakamoto    | 43888-310           | 7325             |
| 7590 06/06/2008<br>MCDERMOTT, WILL & EMERY<br>600 13th Street, N.W.<br>WASHINGTON, DC 20005-3096 |             |                      |                     |                  |
| EXAMINER<br>CHUO, TONY SHENG HSIANG  |             |                      |                     |                  |
| ART UNIT   |             | PAPER NUMBER         |                     |                  |
| 1795   |             |                      |                     |                  |
| MAIL DATE  |             | DELIVERY MODE        |                     |                  |
| 06/06/2008   |             | PAPER                |                     |                  |

**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

**Office Action Summary****Application No.**

10/816,221

**Applicant(s)**

NAKAMOTO ET AL.

**Examiner**

Tony Chuo

**Art Unit**

1795

**Period for Reply** -- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 03 March 2008.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1-4 and 6-9 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-4 and 6-9 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 02 April 2004 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some \* c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO/S508)
- 4) ☐ Interview Summary (PTO-413)
- 5) ☐ Notice of Informal Patent Application
- 6) ☐ Other: \_\_\_\_\_
- Paper No(s)/Mail Date \_\_\_\_\_

## DETAILED ACTION

### ***Response to Amendment***

1. Claims 1-4 and 6-9 are currently pending. Claims 5 and 10-12 are cancelled. The previously stated 112 rejection of claims 10-12 is withdrawn. The amended claims and the English translation of the foreign priority document do overcome the previously stated 102 and 103 rejections. However, upon further consideration, claims 1-4 and 6-9 are rejected under the following new 103 rejection. This action is made FINAL as necessitated by the amendment.

### ***Claim Rejections - 35 USC § 103***

2. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

3. Claims 1-4 and 6-9 are rejected under 35 U.S.C. 103(a) as being unpatentable over Tarui et al (JP 2003/077529) in view of Yamamoto et al (US 2003/0054249).

The Tarui reference discloses a lithium secondary battery using a negative electrode active material capable of absorbing/desorbing lithium comprising an alloy mainly containing silicon and an element selected from the group consisting of Ti, V, Mn, Fe, Co, Zr, Mo, and W, wherein the negative electrode active material is in the form

of a thin film (See Abstract and paragraph [0018]). It also discloses using an amorphous Si phase (See paragraph [0013]).

However, Tarui et al does not expressly teach a surface layer comprising silicon oxide of 0.2 to 1,000 nm in average thickness formed on the inner layer, wherein the average thickness of the surface layer is 1 to 100 nm, wherein the average thickness of the surface layer is 1 to 10 nm, and wherein the surface layer has a thickness in the range of  $\pm 50\%$  of the average thickness. The Yamamoto reference discloses a silicon oxide film "5b" that is formed on an anode layer "3b", wherein the silicon oxide film has a thickness of 1.6 nm (See paragraph [0100],[0101], [0105]). Examiner's note: it is inherent that the silicon oxide film formed by vapor deposition would have a thickness in the range of  $\pm 50\%$  of the average thickness since it is well known in the art that the vapor deposition process forms a very uniform layer (See paragraph [0101]).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the Tarui battery to include a surface layer comprising silicon oxide formed on the inner layer, wherein the surface layer has a thickness of 1.6 nm, and wherein the surface layer has a thickness in the range of  $\pm 50\%$  of the average thickness in order to reduce an anode potential during discharging that results in an increase in a battery operating voltage and to reduce the hydrofluoric acid level in the electrolyte which decreases the resistance within the battery by preventing positive ions in the cathode from eluting or LiF from forming on the anode surface excessively (See paragraphs [0093],[0100],[0111]).

***Response to Arguments***

4. Applicant's arguments with respect to claims 1-4 and 6-9 have been considered but are moot in view of the new ground(s) of rejection.

The applicant also argues that the present claims are further distinguishable over Fukui et al. and Yamamoto et al., as neither reference suggests the unexpected improvements in batteries using negative electrode active materials according to the claimed invention as found, for example, in Tables 3 and 8 of the present specification. As shown in Tables 3 and 8, batteries according to the present invention have a combination of high high-rate discharge capacity (particularly at the C4 rate) and low internal impedance not provided by batteries without silicon oxide films or with silicon oxide films outside the claimed thickness range. As shown in Table 4 of Yamamoto et al, the addition of a silicon oxide film clearly shows an expected improvement in the discharge capacity of the battery. Therefore, the argument of unexpected results is not persuasive.

***Conclusion***

Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Tony Chuo whose telephone number is (571)272-0717. The examiner can normally be reached on M-F, 7:00AM to 3:30PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Patrick Ryan can be reached on (571) 272-1292. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a

Art Unit: 1795

USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

TC

/Jonathan Crepeau/  
Primary Examiner, Art Unit 1795